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Notes on a Collection of Cuban Pteridophyta, with Descriptions of four new Species

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Early in the present year a party consisting of Messrs. Charles Louis Pollard and William Palmer of the United States National Museum, and Dr. Edward Palmer left Washington on a brief collecting expedition to eastern Cuba. Out of some 425 numbers of plants secured no less than 144 are Pteridophyta. These have been placed in our hands for determination. In the following notes four species — one in each of the genera *Alsophila*, *Polypodium*, *Asplenium*, and *Diplazium* — are described as new. Several others, mentioned below as probably undescribed, we have not cared to diagnose at the present time on account of insufficient or sterile material. The other notes are in the nature of comments on rare species and unusual forms or in explanation of nomenclatorial confusion.

Alsophila gracilis sp. nov.

Stipes elongate, slender, deeply triple-grooved on the anterior face, about 7 mm. in the greatest diameter, pale brown, densely armed with short spines; pinnae 30–35 cm. long with 14–16 pairs of deeply pinnatifid pinnae, the lowest 1–2 cm. from the main rachis; pinnules 6–8 cm. long, 1.5–1.7 cm. wide, formed of about 8–13 segments on either side; lower pinnules on short stalks (5 mm. or less) which diminish upward so that the uppermost pinnules are sessile; segments oblong-falcate, coriaceous, smooth on both sides, the margins crenate, incurved; the apex attenuate and crenate; veins mostly once-forked, bearing the globular sori near the middle.

The species is founded upon sheets no. 403248 and no. 403247 in the U. S. National herbarium, representing no. 255

collected by Charles L. Pollard, Dr. Edward Palmer, and William Palmer in the vicinity of Baracoa, Santiago province, Cuba, February 1–7, 1902. A sheet of the same number in the herbarium of the New York Botanical Garden has a longer portion of the stipe. Both herbaria contain earlier specimens collected in eastern Cuba by Charles Wright and distributed (no. 951) as *Alsophila nitens* J. Sw.

ANEMIA HIRTA Sw.?

Numbers 121 and 401 are well matched by a sheet in the U. S. National herbarium (no. 26037) from Jamaica. They represent what Jenman regarded as the true *Anemia hirta* of Swartz, and are presumably what Swartz had in hand when describing this species. They are, however, scarcely the plant represented by Plumier's plate 157 (which Swartz cites), from Martinique.

ORNITHOPTERIS sp.

The specimens of number 232, though probably representing an undescribed species, are sterile and therefore unsatisfactory for purposes of description.

ELAPHOGLOSSUM APODUM (Kaulf.) Schott

Acrostichum apodum Kaulf. Enum. Fil. 59. 1824.

Elaphoglossum apodum Schott, Gen. Fil. *pl. 15*. 1834.

Acrostichum platyneuron Feé, Mém. Fam. Foug. **2**: 43. *pl. 4. f. 1*. 1844–45; *non* L.

The plants collected as no. 152 are certainly identical with Feé's species, judging from both the admirable plate and description; but we do not feel justified in regarding Feé's species as distinct from the *Acrostichum apodum* of Kaulfuss. Hooker and Greville published (Ic. Fil. **1**: *pl. 99*. 1829), a figure of *A. apodum* which matches several sheets at hand, under this name, as well as the new material (no. 152). Feé recognized *A. apodum* as a distinct species; but Moore in transferring *A. platyneuron* to *Elaphoglossum* (Ind. Fil. 364. 1862), hazards the suggestion "*An E. apodum.*" Whether or not the two are one, the name *Elaphoglossum platyneuron* is not available, for the reason that *Acrostichum platyneuron* Feé is antedated by the Linnaean *Acrostichum platyneuron.*

LOMARIOPSIS WRIGHTII Mett.

Of this there are two numbers, both collected near Baracoa — a single sheet of no. 150, but no. 220 in some quantity — and both are quite sterile. The species was described in Eaton's "Filices Wrightianae et Fendlerianae" (Mem. Am. Acad. II. 8: 195. 1863) and is readily distinguishable by the remarkable abruptly caudate apices of the pinnae.

Polypodium cryptum sp. nov.

Plant of small stature, 10–17 cm. high. Rootstock creeping, 1–2 cm. long, about 5 mm. thick; stipes variable in length, commonly 1.5 to 2 times the length of the lamina, articulated, somewhat pubescent, and of a dull greenish straw color: laminae lanceolate, 4.5–7.5 cm. long, greatest width about 2 cm., simple, pinnately lobed, or for the most part partially pinnate below, the lowermost pair of lobes commonly developed into distinct sessile or very short-stipitate orbicular or orbicular-cordate pinnae, the next pair rarely approaching this condition, the upper lobes merely broad obtuse crenations which decrease gradually toward the tapering obtuse apex; venation free, the midvein of each lobe giving off on either side about 4 usually simple veinlets which are enlarged at their extremities: sori somewhat immersed, broadly elliptical, borne one to the veinlet almost exactly half way from the midve into the extremity.

The species is based on sheet no. 403232 in the U. S. National herbarium, representing specimens collected as no. 231 by Charles L. Pollard, Dr. Edward Palmer and Wm. Palmer in the vicinity of Baracoa, Santiago province, Cuba, February 1–7, 1902. The specimens are not in the best condition for study, having somewhat of a weatherbeaten appearance. They are, however, uniform in size and general appearance, appear quite mature and are of such peculiar general morphology that we have thought it best to describe them as a new species which we refer with more or less hesitation to the genus *Polypodium*. The anomalous features are the hidden venation, the unique lobation and the immersed sori. The venation is indeed very well concealed and can scarcely be discerned except by holding the unmounted plant towards strong light. Only the basal veinlets of the lowermost lobes in the larger fronds fork commonly and these only once or twice, most of the veinlets being simple.

POLYPODIUM CRYPTUM

A majority of the plants have the appearance of being quite glabrous; but careful examination of a more perfect specimen shows that the lower portions of the stipe possess an inconspicuous soft stellate pubescence which becomes more scattering above but is rather noticeable on the midvein and lower veins of the frond, and that the margin of the frond is sparingly ciliate.

GONIOPHLEBIUM PILOSELLOIDES (L.) J. Sm.

To this species we have referred numbers 47, 181 and 182. There is to be observed considerable variation, particularly in the shape of the sterile leaf; but the specimens are undoubtedly all referable to the single species.

CAMPYLONEURON REPENS (L.) Presl.

The need of a critical study of the group to which this species belongs, in connection with the types preserved in European herbaria, permits no closer determination of no. 184 than the above which is to be considered merely tentative.

ADIANTUM FRUCTUOSUM Pöppig

We have not seen herbarium material of this species, but judging from the excellent description there can be little doubt that under no. 66 we have the plant described by Pöppig in Sprengel, Syst. Veg. **4**: 113. 1827, and later by Kunze in Linnaea, **9**: 81. 1834.

ADIANTUM FRAGILE Sw.

The specimens of no. 421, although very uniform, are unusual in the shape of the segments which are narrowly cuneate and often somewhat bilobed. Otherwise they seem quite typical.

STRUTHIOPTERIS sp.

The material comprising number 146 consists of sterile leaves only. The species, which is probably undescribed is one of the several forms to which the name *Lomaria attenuata* Willd. is usually given.

Asplenium venustum sp. nov.

Plant 35–67 cm. high. Leaves closely tufted from a nearly naked stoutish suberect rootstock: stipe 15–37 cm., dull grayish-brown: lamina ovate-lanceolate, the apical portion long acuminate,

once or twice cleft below, otherwise similar to the pinnae; pinnae 5–7 pairs, linear, subcoriaceous, subopposite below, alternate above, ordinarily diverging from the axis at an angle of about 30°, the 3 or 4 lowermost pairs 11–15 cm. long and 7–11 mm. broad (at the broadest point, which is about one third the distance from base toward apex); base of pinna narrowly and very obliquely cuneate (becoming stipitate), apparently never auricled, the superior portion only a trifle wider than the inferior; margin unequally biserrate (in large fronds occasionlly triserrate), the teeth rather slender, aute and outwardly curved; veins very oblique, forking usually once; sori 1–2.7 cm. long, borne on the anterior branch and nearly parallel to the midvein; indusium firm.

The above description is drawn from two sheets, nos. 403185 and 403298 in the U. S. National herbarium, representing no. 139 collected by Charles L. Pollard and Wm. Palmer on "slopes and summit of El Yunque, near Baracoa, Santiago province, Cuba. Alt. 1000–2000 feet, January 30–31, 1902. "The species seems to us very distinct; certainly it has nothing to do with *Asplenium erosum* L.,* with it has, in one instance, been confused, — we refer to the reference here of Wright's no. 1043 as "var. *pinnis angustissimis*." † Wright's no. 1043 as represented in the National herbarium (sheet no. 26435) is exactly our plant, though the fronds bear an additional pair or two of pinnae. Reference to Sloane's plate 33, fig. 2, cited by Linnaeus under *A. erosum*, is sufficient to disprove any supposed alliance with the plants there represented.

Asplenium venustum is easily distinguished by the extreme narrowness of the pinnae, their peculiar hacked appearance on account of the acute flaring teeth, and by their extremely oblique gradually narrowed bases. Sheet no. 403185 bears a typical plant 3.8 dm. high, comprising 10 overlapping fronds. Sheet no. 403298 contains a juvenile plant and a single detached frond 6.7 dm. high.

ASPLENIUM MONTEVERDENSE Hooker

This rare species was described in Species Filicum, **3**: 195. 1860 and figured in Hooker's 2d Century of Ferns, *pl. 41*. 1861. It was founded on C. Wright's no. 1029 collected, in 1859, "under overhanging rocks near Monte Verde, on the eastern side

* Sp. Pl. ed. 2, **2**: 1539. 1764.

† Sauvalle, Fl. Cubana, 211. 1878.

of Cuba." The specimens of the present collection (no. 117) are much larger than the original, or indeed than the other specimens we have seen, which are: (1) Matanzas, Cuba, 1849, *Rugel, 9* (C); (2) Eastern Cuba, 1856–1857, *Wright, 856* (Y). Except in size the plants (117) agree well with the original description and plate.

Diplazium aemulum sp. nov.

Plant 40–60 cm. high. Leaves borne in a close crown on a rather slight erect rootstock: stipes 1–2 dm., sparingly paleaceous below with firm dark brownish linear or linear-lanceolate long attenuate scales: large mature lamina broadly lanceolate, broadest just below the middle, dark green, paler beneath, comprising 20 or less pairs of lanceolate pinnae, the lowermost of which diverge from the rachis at an angle of about 70°, the uppermost at from 45° to 60°: pinnae spreading, subopposite below, soon becoming alternate above, the largest 1 dm. long by 1.7 cm. wide, lanceolate, terminating rather abruptly in a serrulate attenuate somewhat falcate apex, the base cuneate (the lower edge much more obliquely so than the upper), the margin pinnatifid into shallow obtusish lobes (about 12), which are regularly serrate by the free repeatedly forking veinlets extending to the margin; sori linear, curved, averaging 5 mm., borne on the first anterior of each group of veinlets; indusia both single and double, the former perhaps predominating.

Type specimen, no. 403220 in the U. S. National herbarium collected on the "slopes and summit of El Yunque, near Baracoa, Santiago province, Cuba, January 30–31, 1902, by Charles L. Pollard and William Palmer; no. 179, altitude 1000–2000 feet." We would also refer here no. 159, same data.

The type sheet consists of a rather small plant about 4 dm. high and a single detached fully matured leaf measuring about 6 dm. The latter is larger than most of the specimens distributed, so that the measurements here given probably represent nearly the maximum for the species. The shallow lobation so characteristic of the larger pinnae is manifest in the smaller ones in less degree and commonly only as an irregular double serration.

DRYOPTERIS LONCHODES (D. C. Eaton) Kuntze

Aspidium lonchodes D. C. Eaton, Mem. Am. Acad. II. **8**: 210. 1863.

Dryopteris lonchodes Kuntze, Rev. Gen. Pl. **2**: 813. 1891.

This species was described from nos. 1007 and 1008 of Wright's Cuban plants. The specimens (no. 239) of the present collection agree closely with the type and represent a remarkably distinct species. We have seen no other specimens.

Polystichum aquifolium nom. nov.

Polystichum ilicifolium Feé, Gen. Fil. 279. 1850–52. Not *P. ilicifolium* Moore, Ind. Fil. 94. 1858, which is *Aspidium ilicifolium* Don, Prodr. Nep. 3. 1825.

We have little hesitation in pronouncing the *Polystichum ilicifolium* of Feé, described from specimens collected by Linden in Santiago province, Cuba, quite distinct from *P. triangulum* or any other species of this group. The name *ilicifolium* is quite untenable by reason of Don's species having been properly transferred to *Polystichum* by Moore. Feé's choice of a specific designation was, however, so much to the point that we can do no better than substitute *aquifolium*, the long-used generic name for the holly.

No. 420 comprises specimens collected near El Cobre, Santiago province, Cuba, by Messrs. Charles L. Pollard and William Palmer, February 21–24, 1902, which are identical with Feé's plants as represented by *pl. 6. f. 4* in his 6th Mémoir (1854).

DANAEA NODOSA (L.) J. Sm.?

A sterile leaf or two of a *Danaea*, collected as number 142, show certain differences from the true *Danaea nodosa*, notably in the extreme closeness of the venation which averages 18 veinlets per centimeter; but neither stipe nor sporophyll being at hand it seems best not to separate as a distinct species.

Dates of the "Nova Genera" of Humboldt, Bonpland and Kunth

By John Hendley Barnhart

Every student of systematic botany is familiar with the abbreviation "H.B.K.," and this at once brings to his mind the great seven-volume work, "Nova genera et species plantarum," commonly credited to Humboldt, Bonpland and Kunth; although the editorial work upon it was wholly Kunth's, and Baron von Humboldt's only contribution appears to have been the introductory essay. This work was the most extensive of several which constituted the botany of Humboldt and Bonpland's "Voyage," and different from the rest in the language employed, this being written in Latin, the others exclusively in French.

Having occasion recently to determine the date of publication of a certain portion of this work, and knowing that as it appeared in parts the title-page dates could not be depended upon, I undertook to ascertain the pagination and dates of all the original fascicles. The only recent reference to this subject which could be found was in a paper published in the Journal of Botany for June, 1901.* The authors of this paper appear to have been investigating the facts surrounding the publication of the zoölogical portion of Humboldt and Bonpland's "Voyage," and to have accumulated incidentally considerable information relating to the botanical volumes; and a debt of gratitude is certainly due them for placing their results within the reach of all.

Messrs. Sherborn and Woodward seem to have given us an accurate and fairly complete account of the "Plantes équinoxiales," "Melastomes," "Rhexies," "Mimoses "and "Graminées" of the Voyage reports, but as much cannot be said of their attempt to elucidate the "Nova genera." On one page they give a summary of the seven volumes, showing that these consist of 55, 51, 57, 39, 54, 68 and 66 sheets or signatures respectively; on the following pages they list the fascicles as announced from time to time in the "Bibliographie de la France," from which it would

* Sherborn, C. D., & Woodward, B. B. The Dates of Humboldt and Bonpland's "Voyage." Jour. Bot. 39 : 202–205. Je. 1901.

appear that the volumes contained about 89, 98, 91, 63, 86, 106 and 119 signatures respectively; after which they merely remark, "[The sheeting of the French records is a mystery to both of us]."

It is well known, or ought to be, that the "Nova genera" appeared simultaneously in two editions, one of folio size, the other in quarto. It is not so well known, except to those who have tried to verify references in the wrong edition, that the two differ widely in pagination; the only printed mention of this fact which I have seen is a brief note by Dr. Otto Kuntze,* and he does not seem to have had access to a copy of the fourth volume of the folio edition. The matter in the two editions is the same; they were issued in the same number of fascicles (36), and at the same time; and the plates were alike in the two editions, except for the width of the margin; but, the quarto page being much smaller, the text extended over a greater number of pages, so that each quarto fascicle consisted of many more pages than the corresponding folio fascicle, and the quarto volumes are thicker than the folio ones. Messrs. Sherborn and Woodward described the quarto volumes; nearly all of their quotations from the "French records" refer to the folio edition; it was for this reason that they were mystified. The "Bibliographie de la France," upon which they were obliged to rely almost wholly for the list they give, repeatedly mentions the quarto edition, and in many cases specifies the "sheeting" of the quarto parts; it is difficult to see how they could overlook this fact, although it may well have added to their perplexity.

The folio edition seems to have been prepared so that subscribers to the entire series of "Voyage" reports might have them of uniform size; the quarto edition, that botanists might secure this particular work at a reduced price. The latter, probably because of its cheapness and consequent greater accessibility to the average student, is the one almost invariably cited by botanists; it is the one always referred to by Kunth himself, in his later works. While convenient, this practice is not strictly logical; for, as the fascicles were issued without breaking signatures, those numbered correspondingly never contained precisely

* Kuntze, O. Rev. Gen. 3^2: 156. 28 S. 1898.

the same text in the folio and in the quarto form. In many instances, in order to determine with exactness the date of publication of a new genus or species, it would be necessary to find out whether it first appeared in a folio or a quarto fascicle. A table showing the genera and species concerned, with the original place and date of publication, might prove useful in determining some question of priority; but such a list would be of very doubtful value until we are more certain than we can be at present of the exact pagination of every fascicle. It is very important, as mentioned by Sherborn and Woodward, that any one possessing the original fascicles, or any of them, should submit them to some bibliographer who would publish a careful description of them; but it must not be forgotten that *contemporary evidence is the best*, for a fascicle may appear to be in its original form, when actually altered in important particulars.

Before proceeding to a consideration of the probable contents of each part, it may be well to take a general survey of the pagination, signatures, etc., of the completed volumes. In this connection it must be remembered that the quadruple title-page in each volume took an entire quarto signature or two folio ones, while these were counted in numbering neither the signatures nor the pages. In some cases the French journal seems to have counted the title-pages in giving the number of signatures in a part, in other cases, not; and the uncertainty in this respect, together with the fact that the title-pages were probably published with the first part of most of the volumes, but with the last part of one or two, causes most of the trouble in definitely assigning certain pages to each fascicle. It must also be borne in mind that a single sheet forms four folio pages, but eight of quarto size, so that while the quarto volumes and fascicles have more pages than the folio, they have fewer signatures. The plates and title-page dates are the same in both editions; it is only in the text that they differ.

Vol.	Folio Text.	Quarto Text.	Plates.	T. p. Date.
I.	(8), xlvi, (2), 302 pp. (2), 87½ (=a–i, k–m, 1–76) sign.	(8), lviii, (2), 377 pp. (1), 54¾ (=a–h, 1–48) sign.	1–96.	1815
II.	(8), 324 pp. (2), 81 sign.	(8), 404 (2) pp. (1), 50¾ (=1–51) sign.	97–192.	1817

III.	(8), 356 pp.	(8), 456 pp.	193–300.	1818
	(2), 89 sign.	(1), 57 sign.		
IV.	(8), 247 pp.	(8), 312 pp.	301–412.	1820
	(2), 62 sign.	(1), 39 sign.		
V.	(8), 338 (2), pp.	(8), 432 pp.	413–512.	1821
	(2), 85 sign.	(1), 54 sign.		
VI.	(8), 420 (2) pp.	(8), 542 pp.	513–600.	1823
	(2), 105½ (= 1–106) sign.	(1), 67¾ (=1–68) sign.		
VII.	(8), 399 pp.	(8), 506 pp.	601–700.	1825
	(2), 100 sign.	(1), 65¼ (=1–66) sign.		

VOLUME I

This volume, in the folio form, presents little difficulty. It is true that fasc. 1 and 2 are noticed together in the B. F.* for 3 F. 1816, while it is quite likely that they were separately published, one or both of them before the end of the year 1815 (the title-page date). As we have absolutely no data indicating the pages at which they were separated, however; and as I have no strong evidence even in support of the supposition that they appeared separately, fasc. 1–2 will be treated here as a "double number." The fascicles forming Volume I folio were noticed as follows:

Fasc. 1–2.	44 sign., *44 pl.*	B. F. 3 F.	1816.
" 3.	20 " *25 pl.*	B. F. 11 My.	" †
" 4.	25½ " *27 pl.*	B. F. 31 Au.	"

In all, 89½ signatures and 96 plates, precisely as the folio volume is described above, and we need have no hesitation in assigning data as follows:

Fasc. 1–2.	T.-p., pp. i–xlviii, 1–120, *pl. 1–44.*	Ja.	1816 (or D. 1815?)
" 3.	Pp. 121–200, *pl. 45–69.*	My.	"
" 4.	Pp. 201–302, *pl. 70–96.*	Au.	"

The B. F. gives no descriptions of fasc. 1–4 in the quarto form, and the following division is simply a provisional one, based upon the supposition that the corresponding quarto and folio parts contained approximately the same matter: a supposition which is warranted by the known facts in the case of many of the later fascicles.

Fasc. 1–2.	T.-p., pp. i–lx, 1–152, *pl. 1–44.*	Ja.	1816 (or D. 1815?)
" 3.	Pp. 153–256, *pl. 45–69.*	My.	"
" 4.	Pp. 257–377, *pl. 70–96.*	Au.	"

* In the following discussion the references to the "Bibliographie de la France" will be so frequent that its title will be abbreviated to "B. F."

† Not 2 My. as given by Sherborn and Woodward.

VOLUME II

This volume consisted of fasc. 5–8. Unfortunately fasc. 5 is badly mixed in the B. F. It is noticed 3 My. 1817, but is called the *fourth* fascicle (an error corrected 13 D. 1817, in noting the next fascicle *), and although the description, "13 feuilles et demie, plus 25 planches," is accompanied by the statement "in-folio," it is evident from the price named that it was the quarto edition which the bibliographer had in hand. There is little doubt, however, that fasc. 5 contained, in the folio form, pp. 1–80, and in the quarto, pp. 1–96, and the B. F. is no doubt correct in saying 25 plates, viz., *pl. 97–121*.

Fasc. 6, 7 and 8 are given by the B. F. as follows:

Fasc. 6.	Folio, 18 sign.	Quarto, 12 sign.	*25 pl.*	13 D. 1817.
" 7.	" 17 sign.	" 11 sign.	*22 pl.*	28 F. 1818.
" 8.	" 50 sign.	" 25 sign.	*34 pl.*	6 Je. 1818.

The record in the case of fasc. 8 is certainly very puzzling. Sherborn and Woodward suggest that the "34" plates may be a typographical error for "24," but there is no need to suppose such an error, for there is little doubt that ten plates (*193–202*) belonging to the following volume appeared with this fascicle. It is the record of the text which is surprising. These three fascicles alone (6, 7 and 8), according to the B. F., contained 85 signatures, folio, while the entire volume had only 83, *title-pages included!* We are left only two explanations: either the B. F. is in error, the folio fasc. 8 consisting of about 26 signatures, the quarto of about 16; or, as is liable to occur in any such work as this, fasc. 8 may have contained a second printing of some of the previously published text, which in its original form was not satisfactory to the authors.

The probable pagination and dates of fasc. 5–8 are as follows:

FOLIO

Fasc. 5.	T.–p. pp. 1–80 (with reprint of vol. I, pp. 301–302?), *pl. 97–121*.	Ap. 1817
" 6.	Pp. 81–152, *pl. 122–146*.	D. "
" 7.	Pp. 153–220, *pl. 147–168*.	F. 1818
" 8.	Pp. 221–324 (+?), *pl. 169–202*.	Je. "

* "Cette sixième livraison est la deuxième du second volume; c'est la cinquième (et non la quatrième), qui a paru en mai dernier."

QUARTO

Fasc. 5.	T.-p., pp. 1–96, *pl. 97–121.*	Ap. 1817
" 6.	Pp. 97–192, *pl. 122–146.*	D. "
" 7.	Pp. 193–280, *pl. 147–168.*	F. 1818
" 8.	Pp. 281–406 (+?), *pl. 169–202.*	Je. "

VOLUME III

The third volume consisted of five fascicles, nos. 9–13; although plates 193–202 had appeared with fasc. 8. The B. F. gives the data for these fascicles, in folio, as follows:

Fasc.	9.	20	signatures,	*25 plates.*		3 O.	1818.
"	10.	19	"	*15*	"	13 F.	1819.
"	11.	19	"	*25*	"	17 Jl.	"
"	12.	18	"	*25*	"	27 N.	"
"	13.	15	"	*9*	"	11 Mr.	1820.

The number of signatures agrees exactly with the description of the volume given above, so that we have no hesitation in deciding upon the pagination. We have here mention of only 99 plates, however, while the volume contained 108, one of which was issued twice, as will be mentioned further on; and this, with the distinct statement of the B. F. that fasc. 13 completed the third volume, is additional evidence that the B. F. was correct in assigning 34 plates to fasc. 8. If more evidence is desired, it is not lacking. The "Allgemeine Repertorium" of Leipzig, in its first mention of this work,* reviews the folio edition as far as Vol. III, page 148, *plate 242;* evidently to the end of fasc. 10 ("1818," by the way). Now if fasc. 10 ended with plate 242, and contained 15 plates, it must have begun with plate 228; if fasc. 9 ended with plate 227, and contained 25 plates, it must have begun with plate 203; but the volume began with plate 193; therefore, plates 193–202 must have appeared with fasc. 8, and the B. F. must be correct in assigning 34 plates to that fascicle — or, if it contained only 24, there must have been 25 plates in fasc. 10, instead of 15 as stated. At least, the B. F. is consistent with itself in this matter, and I prefer to accept its statements until they are proven incorrect.

Plate no. 216 was published in fasc. 9, the name upon it reading "*Aragoa juniperina.*" When this species was reached in the text, however, in fasc. 10 (page 121 of the folio, page 156 of the

* Allg. Repert. 1819[3]: 132–136.

quarto), it was called "*Aragoa cupressina*"; and later (not with fasc. 10, but probably with fasc. 13), a new plate numbered "216" appeared. The new plate bore the corrected name, and upon it the original detail figures were replaced by entirely new ones.

Fasc. 9 contained the descriptions of certain new species of *Nicotiana* and *Heliotropium*, which had been published by Lehmann, under the same or in some cases under different names, only a short time before. This greatly annoyed Kunth, who thought that Lehmann should have awaited the appearance of this portion of the "Nova genera" before issuing his work. A letter written by Kunth in this connection, with Lehmann's reply, may be found in the first volume of Flora.*

In noting fasc. 9–13, the B. F. mentions the quarto edition several times, but gives the number of signatures only in the case of fasc. 10, when there were twelve. There is little doubt of the pagination, however, and we may, sum up this volume thus:

Folio Text.	Quarto Text.	Plates.	Date.
Fasc. 9. T.-p., pp. 1–72.	T.-p., pp. 1–96.	*203–227.*	S. 1818.
" 10. Pp. 73–148.	Pp. 97–192.	*228–242.*	F. 1819.
" 11. Pp. 149–224.	Pp. 193–288.	*243–267.*	Jl. "
" 12. Pp. 225–296.	Pp. 289–384.	*268–292.*	N. "
" 13. Pp. 297–356.	Pp. 385–456.	*293–300, 216 bis.*	Mr. 1820.

Volume IV

Volume IV comprised fasc. 14–18, the last of which was not given to the public until late in the year 1820; although, as we shall see, the entire text was in print, and to a limited extent accessible, two years earlier. According to Sherborn and Woodwood, fasc. 14 contained Vol. III, pp. 417–456, and Vol. IV, pp. 1–72. It is apparent that they were led to this conclusion by some evidence that this fascicle ended with page 72 (which is true of the quarto); but as 72 pp. in their quarto edition made only 9 signatures, and the B. F. stated that fasc. 14 consisted of 14 signatures, they decided that this fascicle must have contained the last five signatures (which would be pp. 417–456 of the quarto) of Vol. III — in other words, their confusion of the two editions in this case led them into grave error. The B. F. distinctly states that fasc. 13 completed the third volume, and there can be no doubt that this was the case.

* Flora, 1: 601–607. 20 D. 1818.

Sherborn and Woodward, in describing fascicle 15, say of the plates: "25 pls. 326–340." This is plainly either a clerical or a typographical error; the 25 plates were nos. 326–349, two plates bearing the number "332."

The B. F. gives us quite complete data for this volume:

Fasc. 14.	Folio, 14 sign.	Quarto, 9 sign.	*25 plates.*	15 Ap. 1820.
" 15.	" 16 sign.	" 10 sign.	*25* "	27 My. "
" 16.	" 12 sign.	" 9 sign.	*24* "	22 Jl. "
" 17.	" 12 sign.	" 8 sign.	*24* "	16 S. "
" 18.	" 9 sign.	" 4 sign.	*13* "	24 D. "

The "13" plates credited to fasc. 18 probably should be 15; and in counting the folio signatures the title-pages, which in this case seem to have come out with the last fascicle of the volume instead of the first, must have been reckoned as one instead of two. This gives the following summary.

	Folio Text.	Quarto Text.	Plates.	Date.
Fasc. 14.	Pp. 1–56.	Pp. 1–72.	*301–325.*	Ap. 1820.
" 15.	Pp. 57–120.	Pp. 73–152.	*326–332 bis, 332–349.*	My. "
" 16.	Pp. 121–168.	Pp. 153–224.	*350–373.*	Jl. "
" 17.	Pp. 169–216.	Pp. 225–288.	*374–397.*	S. "
" 18.	Pp. 217–247, t.-p.	Pp. 289–312, t.-p.	*398–412.*	D. "

It will be noted that these five fascicles followed one another with unprecedented rapidity; and "thereby hangs a tale." On the 26th of October, 1818, in order to fix the date of publication of this volume, Kunth presented a complete copy of the text to the Academy of Sciences of Paris. It consisted of loose sheets of the folio edition, and had a manuscript title-page, on which was set forth the fact that the printing was begun in September, 1817, and completed in September, 1818. At this time the publication of Volume III had only just begun, and Kunth had no idea of offering Volume IV to the public until it was reached in its turn after the completion of Volume III; in fact, the plates of Volume IV had not been engraved. Yet Kunth hurried the text through the press, and took this method of securing its advance publication.

Henri Cassini, one of the members of the Academy, had devoted his leisure "for the past eight or nine years," as he tells us, to the study of the Compositae, and was at that time recognized as the foremost living authority upon that group of plants. Volume IV of the "Nova genera" comprised the Compositae,

and the Compositae only; was it any wonder, then, that Cassini regarded the "extraordinary precipitancy" of Kunth, in presenting this copy to the Academy, as a decidedly personal affair? Cassini criticised Kunth for issuing the work in this way, in loose sheets, with a manuscript title, and without plates; in the folio form, too, "qui n'est probablement consacré qu'a un petit nombre d'exemplaires," while the quarto is the one more generally distributed and usually quoted. But especially did he protest against the recognition of this method of publication, as it contained no guarantee that the work as finally issued to the public would be identical with the copy presented to the Academy.

Kunth insisted that Volume IV was printed simply because the funds were available and the manuscript had been completed for several years; he pledged his honor that the work as finally issued to the public would be identical with the copy presented to the Academy, except for the alteration of one short and unimportant paragraph to which Cassini had objected; and he further mollified the latter by presenting him with a copy of the volume in dispute, on the first of December, 1818. On his part Cassini agreed to accept the latter date as the actual date of publication. A delicate question is here involved. We cannot insist that this volume was not published in 1818 because it was not offered for sale at that time, for some works whose due publication is never questioned (Linnaeus' "Hortus Cliffortianus" is a famous example) were never offered for sale until at length second-hand copies came into the market. It is universally agreed that as long as all copies of a printed work remain in the hands of the author, its status is the same as that of a manuscript, even if he permits it to be inspected by others. But does the distribution of one or two copies constitute publication? The question here is almost identical with that involving the date of publication of Fournier's "Mexicanas Plantas, Pars II. Gramineae." This bears the date 1886 upon the title-page, and was not accessible to the general public until that year; but Bentham had a copy of the text as early as 1881, and repeatedly cited it; nor is it certain that other complimentary copies were not issued in advance.

We come now to consider the single change in Volume IV after it was first printed. A note, near the bottom of page 243,

in the "addenda et corrigenda," read originally as follows: "Pars hujus operis, quae de Compositarum familia tractat; jam ante tres fere annos a me finita, illo tempore, a clarissimo Henrico Cassini, leviter quidem, ob magnam specierum et generum copiam inspecta est. Quo factum est, ut nomina et characteres generum nostrorum novorum non retinens, Ampherephis speciei tertiae, in herbario illustr. Jussieu asservatae, tanquam distincto generi, nomen Centhratheri imponeret." Immediately and indignantly did Cassini resent this implied reflection upon his honor, and brand it as a falsehood; and although Kunth maintained that no offense had been intended by the original staement, the objectional paragraph was modified until, as finally presented to the subscribers to the "Nova genera," it took this harmless form: "Pars hujus operis quae de Compositarum familia agit, jam exeunte anno 1815 a me ad finem perducta, nonnisi mense septembre 1817 typis describi coepta est, absoluta eodem mense 1818, vulgata 1820. Interea celeberrimus Cassinius, observationum mearum inscius, Compositas summa diligentia raraque sagacitate scrutari continuavit sectionesque et genera proponere: quo factum est, ut eorum complura diversis nominibus a Cassinio et me nuncupata exstent; quod semper usu veniet, quotiescunque duo in plantas examinandas aeque exercitati botanici eandem familiam investigant generaque in ea instituere necesse judicant et instituunt. Ampherephis species duas in herbario Humboldtiano observavi, tertiam in herbario Jussiaeano, cui nomen a me inventum tunc stylo cerussato adscribere haud neglexi, Celeberrimus Cassinius vero non animadvertens, opinor, id nomen ibi jam a me appositum esse, plantae Jussiaeanae nomen Centratheri imposuit."

Those wishing to learn further particulars of this controversy should consult the papers by Cassini and Kunth, published in volume 89 of the "Journal de physique, de chimie et d'histoire naturelle;" * and those who do not acknowledge that the volume was published until issued in parts in 1820, should not overlook

* Cassini, H. Analyse critique et raisonnée du quatrième volume de l'ouvrage de M. Kunth, intitulé, *Nova genera et species plantarum.* Jour. phys. **89**: 5–33. Jl. 1819.

Kunth, C. S. A une article de M. Cassini, ayant pour titre: *Analyse critique et raisonnée du quatrième volume du* Nova genera et species plantarum aequinoctialium. Jour. phys. **89**: 278–284. O. 1819.

the fact that the new genera were all listed and criticised by Cassini in this "Journal de physique" during the preceding year.

VOLUME V

This volume consisted of fasc. 19–23, and the B. F. furnishes quite a complete account of them, except in the case of quarto fasc. 21, which probably was composed of 12 signatures.

Fasc. 19.	Folio, 16	sign.	Quarto, 9	sign.	*24 plates.*	26 My.	1821.
" 20.	" 14	"	" 8	"	*24*	"	29 S.	"
" 21.	" 16	"	" –	"	*20*	"	23 F.	1822.
" 22.	" 15	"	" 10	"	*20*	"	29 Je.	"
" 23.	" 25½	"	" 15⅓	"	*15*	"	22 Mr.	1823.

The pagination and plates were probably as follows:

FASC.	FOLIO TEXT.	QUARTO TEXT.	PLATES.
19.	T.-p., pp. 1–56.	T.-p., pp. 1–64.	*413–436.*
20.	Pp. 57–112.	Pp. 65–128.	*437–460.*
21.	Pp. 113–176.	Pp. 129–224.	*461–480.*
22.	Pp. 177–236.	Pp. 225–304.	*481a–b, 482, 483, 483a, 484–498.*
23.	Pp. 237–338.	Pp. 305–332.	*499a–b, 500–512.*

The two unnumbered pages of the folio edition following page 338, and the corresponding pages of the quarto edition, *may* have appeared at a later date.

VOLUME VI

Six fascicles constituted this volume, viz. nos. 24–29. Of these the B. F. gives data for quarto fasc. 24–26, and all the folio fascicles. There is evidently some error in the number of plates assigned to fasc. 24, unless many of the earlier plates were reissued at this time. This makes the numbers of the plates in each fascicle of this volume quite doubtful:

Fasc. 24.	Folio, 28 sign.	Quarto, 10 sign.	*37 plates.*	19 Ap.	1823.
" 25.	" 17 sign.	" 12 sign.	*15*	"	30 Au.	"
" 26.	" 15 sign.	" 9 sign.	*15*	"	24 Ja.	1824.
" 27.	" 16 sign.		*17*	"	24 Ap.	"
" 28.	" 15 sign.		*16*	"	21 Au.	"
" 29.	" 15 sign.		*15*	"	4 S.	"

In noting the folio, the title-page seems to have been counted as one signature; and the two unnumbered pages forming signature 106, at the end of the volume, do not seem to have been included, and may have appeared with a later fascicle. From the description in Férussac's Bulletin (cited by Sherborn and Wood-

ward) we can fix the pagination of quarto fasc. 28, and indirectly that of the preceding and following fascicles. The following is a record of this volume as I understand it:

Fasc. 24.	Folio, T.-p., Pp. 1–108.	Quarto, T.-p., Pp. 1–72.	*Pl. 513–522?*
" 25.	" Pp. 109–176.	" Pp. 73–168.	*Pl. 523–537?*
" 26.	" Pp. 177–236.	" Pp. 169–240.	*Pl. 538–552?*
" 27.	" Pp. 237–300.	" Pp. 241–320.	*Pl. 553–569?*
" 28.	" Pp. 301–360.	" Pp. 321–392.	*Pl. 570–585?*
" 29.	" Pp. 361–420 (2?).	" Pp. 393–542.	*Pl. 586–600?*

In this volume, for the first time, the proportionate size of the corresponding folio and quarto parts is widely at variance.

VOLUME VII

The final volume was published in fasc. 30–36. As the B. F. says that fasc. 30 (folio) was composed of 13 signatures, while it quite certainly contained only pp. 1–48, the other signature very likely consisted of the "addenda et corrigenda" of Volumes V and VI. It may have represented the title-pages of Volume VII, but as these are dated 1825, they were probably issued with the last part (fasc. 36). Fasc. 36, too, is said to have been composed of 29 signatures; if so, some 18 of these must have been re-issues of earlier portions of the work. The B. F. mentions the quarto edition several times, but fails to give its sheeting. Its record of the folio is this:

Fasc. 30.	13 signatures.	*15 plates.*	13 N. 1824.
" 31.	16 "	*15* "	25 D. "
" 32.	16 "	*15* "	19 F. 1825.
" 33.	15 "	*15* "	14 My. "
" 34.	15 "	*15* "	18 Je. "
" 35.	15 "	*18* "	30 Jl. "
" 36.	29 "	*10* "	3 D. "

The probable pagination is given herewith, but it must be confessed that in the case of the quarto this is largely guess work.

FASC.	FOLIO TEXT.	QUARTO TEXT.	PLATES.	
30.	Pp. 1–48.	Pp. 1–56.	*601–615.*	N. 1824.
31.	Pp. 49–112.	Pp. 57–144.	*616–630.*	D. "
32.	Pp. 113–176.	Pp. 145–224.	*631–645.*	F. 1825.
33.	Pp. 177–236.	Pp. 225–296.	*646–659 659 bis.*	My. "
34.	Pp. 237–296.	Pp. 297–376.	*660–661 bis, 662–673.*	Je. "
35.	Pp. 297–356.	Pp. 377–448.	*674–688 bis, 689–690.*	Jl. "
36.	Pp. 357–399(+?).	Pp. 449–506(+?).	*691–700.*	N. "

RÉSUMÉ

The following résumé is intended merely as an aid to those who may wish to determine quickly the probable date of publication of a given page or plate. Consequently all details of title-pages, repeated plates, etc., are omitted. Data which seem to me certain beyond a reasonable doubt are indicated by an exclamation point (!), while a mark of interrogation (?) accompanies those which are simply guesses. The unmarked data are chiefly strong probabilities.

FASC.	VOL.	FOLIO TEXT, PP.	QUARTO TEXT, PP.	PLATES.	DATE.	
1–2	I.	i–xlviii, 1–120.	i–lx, 1–152?	*1– 44!*	Ja. 1816.	[B. F. 3 F.]
3		121–200.	153–256?	*45– 69!*	My. "	[B. F. 11 My.]
4		201–302.	257–377?	*70– 96!*	Au. "	[B. F. 31 Au.]
5	II.	1– 80!	1– 96.	*97–121!*	Ap. 1817.	[B. F. 3 My.]
6		81–152.	97–192!	*122–146!*	D. "	[B. F. 13 D.]
7		153–220.	193–280.	*147–168!*	F. 1818.	[B. F. 28 F.]
8		221–324.	281–406.	*169–202!*	Je. "	[B. F. 6 Je.]
9	III.	1– 72.	1– 96!	*203–227!*	S. "	[B. F. 3 O.]
10		73–148!	97–192.	*228–242*	F. 1819.	[B. F. 13 F.]
11		149–224.	193–288.	*243–267?*	Jl. "	[B. F. 17 Jl.]
12		225–296.	289–384.	*268–292?*	N. "	[B. F. 27 N.]
13		297–356.	385–456.	*293–300?*	Mr. 1820.	[B. F. 11 Mr.]
14	IV.	1– 56.	1– 72.	*301–325!*	Ap. "	[B. F. 15 Ap.]
15		57–120.	73–152.	*326–349!*	My. "	[B. F. 27 My.]
16		121–168.	153–224?	*350–373!*	Jl. "	[B. F. 22 Jl.]
17		169–216.	225–288?	*374–397!*	S. "	[B. F. 16 S.]
18		217–247.	289–312.	*398–412!*	D. "	[B. F. 24 D.]
		(Entire folio text of Volume IV. accessible at Paris from 26 O. 1818.				
19	V.	1– 56.	1– 64.	*413–436.*	My. 1821.	[B. F. 26 My.]
20		57–112.	65–128.	*437–460.*	S. "	[B. F. 29 S.]
21		113–176.	129–224.	*461–480.*	F. 1822.	[B. F. 23 F.]
22		177–236.	225–304.	*481a–498.*	Je. "	[B. F. 29 Je.]
23		237–338.	305–332.	*499a–512.*	Mr. 1823.	[B. F. 22 Mr.]
24	VI.	1–108.	1– 72.	*513–522?*	Ap. "	[B. F. 19 Ap.]
25		109–176.	73–168.	*523–537?*	Au. "	[B. F. 30 Au.]
26		177–236.	169–240.	*538–552?*	Jan. 1824.	[B. F. 24 Ja.]
27		237–300.	241–320.	*553–569?*	Ap. "	[B. F. 24 Ap.]
28		301–360.	321–392!	*570–585?*	Au. "	[B. F. 21 Au.]
29		361–420.	393–542.	*586–600?*	S. "	[B. F. 4 S.]
30	VII.	1– 48!	1– 56.	*601–615!*	N. "	[B. F. 13 N.]
31		49–112.	57–144.	*616–630!*	D. "	[B. F. 25 D.]
32		113–176.	145–224.	*631–645!*	F. 1825.	[B. F. 19 F.]
33		177–236.	225–296.	*646–659bis!*	My. "	[B. F. 14 My.]
34		237–296.	297–376.	*660–673!*	Je. "	[B. F. 18 Je.]
35		397–356.	377–448.	*674–690!*	Jl. "	[B. F. 30 Jl.]
36		357–399.	449–506.	*691–700!*	N. "	[B. F. 3 D.]

There is little doubt that the first two fascicles were dated "1815," and that fascicle 10 was dated "1818"; and it is not certain that these fascicles were not actually issued before the close of those years. In fact, all of the dates under which notices appeared in the "Bibliographie de la France" may be as much as six or eight weeks later than the actual publication of the fascicles.

TARRYTOWN, N. Y.

The Polyporaceae of North America. I. The Genus Ganoderma*

By William Alphonso Murrill

It is evident, even to the beginner in mycology, that the present classification of the higher fungi is not satisfactory. This is particularly true of the group containing *Polyporus* and its allies, which is at present very imperfectly divided into genera, and contains many species which are confused and uncertain, because of the incompleteness of the original descriptions. Before the group can be reduced to order, full descriptions must be had of all its species, the type specimens in Sweden, England, Germany, and elsewhere must be examined, and sufficient knowledge gained of the life and habits of each plant to determine its natural position in the group. In this paper an attempt is made to present in order the members of the "*lucidus*" group of *Polyporus* occurring in North America. A large number of the specimens examined have been collected during several years past by Professor Lucien M. Underwood, and by various contributors to his private herbarium. The extensive literature and large collections of the New York Botanical Garden and Columbia University have also been most generously placed at the writer's disposal.

I desire also to express my appreciation of the many courtesies extended me by Professor Paul Magnus, Mr. P. Hennings, Professor Kjellman, Professor T. M. Fries, Professor H. Von Post, Mr. Lars Romell, Mr. W. B. Hemsley, Mr. George Massee and others, while studying forms of this group in Germany, Sweden, and England.

History of the Genus

The species upon which this genus was founded was first described in its immature form as an agaric, but when perfect specimens were obtained it was placed in *Boletus*, a genus established by Dillenius in 1719 to include all pore-bearing fungi, and later adopted by Linnaeus, although Micheli had erected

* Read by invitation before the Botanical Society of America, Pittsburg, June, 1902.

the genus *Polyporus* as early as 1729. *Polyporus* was used by Persoon in his Synopsis only as a subgenus under *Boletus*, from which position it was later raised by Fries to equal rank with *Boletus* and made to include the woody forms of pore-bearing fungi. In 1851, Fries tried the experiment of breaking *Polyporus* up into *Fomes*, *Polystictus*, and *Poria*, a division which, though discontinued in his later works was resurrected by Cooke in his *Praecursores* in 1885 and adopted by Saccardo and others since.

When a systematic arrangement of the Polyporaceae of Finland was undertaken by Karsten (Rev. Mycol. 1881), one of the new genera established was *Ganoderma*, which was based upon the laccate character of pileus and stipe and embraced *Polyporus lucidus* only. In Karsten's "Finlands Basidsvampar" published in 1889, *Ganoderma* is characterized as follows: "Basiderna 4-sporiga, n. klotrunda, cystiderna icke anmärknings värda. Sporerna äggrunda eller elliptiska, värtiga, gulbrunaktiga." Although no mention is here made of the laccate pileus and stipe, no other species are included with *G. lucidum* in the genus. As a synonym of *Ganoderma*, Karsten here mentions *Placodes Quél.*, which genus was erected in 1886 to include a variety of forms which were "covered with a hard crust, without zones or concentrically sulcate, persistent, woody." Along with *P. lucidus* in one of the subdivisions are placed also *P. dryadeus*, *P. resinosus*, *P. erubescens*, and *P. helveolus*.

The transfer of *G. lucidum* from *Ganoderma* Karst. to *Phaeoporus* Schroet. in Schroeter's flora of Silesia was a violation of modern principles and consequently could not meet with general favor. In 1887, Patouillard, following the lead of Quélet, extended the range of *Ganoderma* to include all forms of Polyporaceae with colored spores, adhering tubes and shining crusted pilei; and in 1889 he published a partial monograph of the genus as extended, listing forty-eight species, which were arranged in subgroups upon spore characters. As to the wisdom of so broad a treatment of the genus mycologists appear to be divided. The following synopsis includes only those species which, while essentially alike in internal structure, possess a shining varnished surface produced by the exudation and hardening of a reddish juice similar to that found in *G. pseudoboletus*.

Synopsis of the North American Species

1. Context pallid to tawny. 2.
   Context umbrinous-chestnut. 5.
2. Spores over 6 μ long, verrucose, ferruginous. 3.
   Spores less than 6 μ long, smooth, pale; pileus less than 3 cm. broad, margin entire; tubes not stratified. 4. *G. parvulum.*
3. Context ochraceous to fulvous; plants stipitate or sessile, growing on deciduous trees. 4.
   Context pallid; plants usually stipitate, annual, growing on hemlock. 1. *G. tsugae.*
4. Plants stipitate, or rarely sessile, perennial; margin of pileus truncate at maturity. 2. *G. pseudoboletus.*
   Plants sessile, annual; margin of pileus acute. 3. *G. sessile.*
5. Spores smooth, pale yellowish-brown. 6.
   Spores roughly echinulate, dark brown; pileus sessile, very thick, its diameter decreasing downward; context less than one third the length of the tubes. 5. *G. Oerstedii.*
6. Pileus zonate, even; tubes not stratified. 6. *G. zonatum.*
   Pileus sulcate, azonate; tubes stratified. 7. *G. sulcatum.*

1. **Ganoderma tsugae** sp. nov.

A conspicuous reddish-chestnut fungus growing on dead or dying hemlock. Pileus corky to woody, fan-shaped, convex above, concave below, 4–20 × 5–25 × 1–4 cm.;* surface glabrous, uneven, concentrically sulcate, laccate, lustrous, yellowish-red to mahogany-colored, at length black; margin light-yellow, acute, becoming concolorous, truncate, and marked with many shallow furrows, often undulate and at times more or less lobed: context soft-corky, radiate-fibrous, white or nearly so, 1–3 cm. thick; tubes annual, 0.5–0.75 cm. long, 6–4 to a mm., brown within, mouths circular or polygonal, white to light-cinnamon, edges obtuse, becoming acute: spores ovoid, obtuse at the summit, attenuate and truncate at the base, verrucose, yellowish-brown, 9–11 × 6–8 μ: stipe lateral, ascending, frequently forked, cylindrical, equal, 2–20 × 1–4 cm., resembling the pileus in color, surface and context.

This fungus occurs only on *Tsuga Canadensis*, upon the decaying trunks and roots of which it is very abundant. In West Virginia and New York it has been found full grown as early as June, but it may not reach maturity until autumn, when it speedily de-

* These figures indicate length, breadth and thickness respectively. When the stipe is lateral the pileus is an outgrowth from it and length is measured in the direction of this growth. When the pileus is sessile, the tubercle marking the beginning of growth may be considered a lateral stipe much reduced. When the question of length is settled, breadth and thickness need no explanation.

cays or falls a prey to insects. So subject is it to insect attack that recognizable specimens are rare in the herbarium. As its ordinary host is confined to America, there is no reference to it in European literature, unless the plants found on *Picea excelsa* by Karsten in Sweden belong here rather than with *G. pseudoboletus.*

Extensive collections of various forms of this species were made by Professor Underwood at Syracuse, N. Y., in July 1884, and at West Goshen, Conn., August 1896. Miss A. M. Vail brought specimens from Tyringham, Mass., in August 1897.* Professor G. F. Atkinson has figured the species in plate 66 of his work on mushrooms. Wherever the hemlock grows it appears to be common. It is nearly related to *G. pseudoboletus*, but is annual, grows on coniferous trees, decays soon after maturity, and is usually much lighter in weight and paler in substance.

2. **Ganoderma pseudoboletus** (Jacq.)

Agaricus pseudoboletus Jacq. Flor. Austr. **1**: 26–27. *pl. 41.* 1773.

Boletus rugosus Jacq. Flor. Austr. **2**: 44. *pl. 169.* 1774.

Boletus lucidus Leyss. Flora Halensis, 300. 1783.

Boletus obliquatus Bull. Herb. de la France, *pl. 7.* 1780; *pl. 459.* 1790.

Polyporus lucidus Fries, Syst. Myc. **1**: 353. 1821.

Polyporus laccatus Pers. Myc. Eur. **2**: 54. 1825.

Polyporus Curtisii Berk. Kew Gard. Misc. **1**: 101. 1849.

A large fungus common on decaying trunks and stumps of deciduous trees conspicuous on occount of its brilliant varnished appearance. Pileus corky to woody, usually kidney-shaped, convex above, concave below, 2–20 × 2–25 × 1–5 cm., yellow to reddish-chestnut or black; surface glabrous, shining, laccate, broadly sulcate and usually marked with concentric lines or bands of a darker color; margin white or light yellow, sterile, thin, acute, becoming truncate, sulcate, and concolorous as new strata are added; context soft-corky or woody, radiate-fibrous, concentrically banded, ochraceous above, tawny next to the hymenium: tubes one- to many-layered, the strata varying in distinctness, 0.5–2 cm. long, 3–5 to a mm., brown within; mouths circular to

* During the summer of 1902 fine specimens have been collected in the hemlock grove of the New York Botanical Garden by Messrs. Burnham and George, in Connecticut by Miss White, and in Ohio by Professor A. D. Selby.

hexagonal, white or yellow, at length brown, dissepiments entire, obtuse, becoming acute: spores ovoid, obtuse, at the summit, attenuate and truncate at the base, yellowish-brown, verrucose, 9–11 × 5–6 μ: stipe lateral, excentric, central, or wanting, erect to ascending, 0–30 × 0.5–4 cm., equal, irregular, or enlarging above, concolorous, glabrous, shining, laccate, the substance similar to the context and darker at the center.

On living or dead trunks, stumps, or roots of oak, alder, hazel, maple, willow, honey-locust, sweet-gum, and beech in Sweden, Germany, Bavaria, France, England, America and Australia. American material has been examined from New York, New Jersey, Delaware, Pennsylvania, Ohio, Indiana, Kentucky, Michigan, Virginia, North Carolina, South Carolinia, Georgia, Florida, Alabama, Mexico, and Nicaragua.

This fungus has been found fossil in the lake dwellings of Switzerland and has been known for a long time on account of its conspicuous coloring caused by a thick glutinous juice which exudes from its surface and dries upon it as a thin lustrous coating. Albino or semi-albino forms occur where the coating is lacking or incomplete. In age the varnish disappears and the pileus takes on a grayish weather-beaten appearance. As the young pileus begins to form at the end of the stipe it is white or yellow in color without varnish and somewhat resembles an unexpanded agaric. It is this stage that Jacquin figured and described in his Flora Austriaca as *Agaricus pseudoboletus*. Several immature plants were found by him in a grove growing about the base of a dead oak trunk. The description he gives is quite a good one and, taken with the fine colored plate, leaves no doubt as to the identity of the specimens. The succeeding year he collected several mature plants which he described as *Boletus rugosus* as follows:—

"Fungus speciosus putridis arborum truncis innascitur, totus lignoso-coriaceus et persistens. Stipes durus, inaequalis, badius, vernice veluti obductus, calamum vel policem crassus ratione voluminis ipsius fungi, pileum gerit plerumque subdimidiatum, dum laterali ejusdem parti adnecitur. Hic superne planus est, rugosus primum, ex rubro badius et nitidissimus, tandem hepaticus minusque nitens. Corticis pauca substantia est interne coriacea, holoserisea, cinnamomea, tenax atque ad fomitem apta. Substantia tubulosa concolor, crassa, a corticosa separabilis, subtilissime porosa; subtus punctata, in principio pallens, sensim magis cinnamomea; ad cibum inepta. Fungi duo, ex eodem loco exorti, et majores, in tabula proponuntur, hinc atque illiuc spectati. Tum fungulus minor; et fungi pars, ut pateant interiora."

The specimen upon which Leysser's *Boletus lucidus* is founded was collected by Curtis on a decaying hazel stump near London in November, 1780, and figured in Flora Londinensis, **4**: *pl. 224*. Leysser's description is as follows:—

"*Boletus lucidus stipitatus, pileo coriaceo castaneo lucido sulcis circularibus, poris minutissimis, albis, stipite laterali.*"

Specimens collected by Rev. M. A. Curtis in South Carolina seemed to Berkeley sufficiently distinct from Leysser's plant to constitute a new species, which he thus describes in Kew Garden Misc. **1**: 101. 1849:—

"Pileus excentric, soft-corky, sulcate, zonate, ochroleucous, in places sanguine-lacquered; stipe elongated, rugose, sanguine-lacquered; hymenium from white to ochraceous, pores punctiform."

A special study of many specimens called *Polyporus Curtisii* Berk. shows them to be only variations of *G. pseudoboletus* due to age, rapidity of growth, and perhaps to differences in the host. The yellowish form so common in the southern part of the United States is figured by Bulliard and Gillet as also occurring in France, while farther north the color is usually darker and more lustrous, the texture firmer, and the hymenium less stratose. These differences are not sufficiently constant, however, to enable one to separate the forms geographically.

Another interesting variation observed by Langlois in Louisiana is so distinct from the ordinary form of the plant that it might easily deceive the skilled mycologist. Specimens in the Underwood herbarium have the stipe exactly central, the pileus very even and thin, at first deeply infundibuliform with white margin, at length becoming nearly plane, reddish-brown, and polished, with the margin concolorous.

3. **Ganoderma sessile** sp. nov.

A large sessile plant, with wrinkled varnished cap and acute margin, found on decaying deciduous trees. Pileus corky to woody, dimidiate, sessile, imbricate or connate at times, conchate, thickest behind, thin at the margin, 5–15 × 7–25 × 1–3 cm., yellow to reddish-chestnut, at length opaque dark brown; surface glabrous, laccate, shining, radiate-rugose, concentrically sulcate, usually marked near the margin with alternating bay and tawny zones; margin very thin and acute, usually curved down-

ward, often undulate, not becoming truncate, white, at length concolorous: context soft-corky or woody, radiate-fibrous, concentrically banded, ochraceous-fulvous; tubes 0.5–2 cm. long, 5–3 to a mm., brown within, mouths circular or angular, white to grayish-brown, edges thin, entire: spores ovoid, obtuse at the summit, attenuate and truncate at the base, verrucose, yellowish-brown, 9–11 × 6–8 μ.

This species occurs on deciduous trees and has the general habit of *G. pseudoboletus*, from which it differs in being annual and sessile, with a very acute margin and a more rugose surface. So far as I have been able to determine, it does not occur in Europe, and has not yet been figured. Specimens have been collected by Professor L. M. Underwood on decaying oak at Greencastle, Ind., Oct. 1894, and at White Plains, N. Y., May 1897, and on dead sycamore at Fort Lee, N. J., May 1899, and March 1901. Plants collected by Morgan in the Miami Valley, Ohio, Dec. 1894, were placed under *G. pseudoboletus* and referred to in the following note: "As it grows in this region, the stipe is always more or less deformed and often wanting; the pilei, when sessile, are sometimes imbricated and connate." In Dec. 1896, it was found by C. F. Baker, at Auburn, Ala., and in Nov. 1897, Rev. A. B. Langlois collected it near St. Martinsville, La., on decaying logs in low woods and marked it "Perhaps a form of *F. lucidus?*" Miss Sadie F. Price has recently sent to the New York Botanical Garden from Bowling Green, Ky., two specimens of this plant collected on oak in Nov. 1901, and Feb. 1902. Specimens sent to Kew by American collectors are included there under *G. pseudoboletus*.

4. **Ganoderma parvulum** sp. nov.

A very small sessile fungus shining bay above and honey-yellow below. Pileus woody, nearly circular in outline, attached by a point, convex above, plane or convex below, thickest behind, 2 × 2.5 × 1 cm.; surface glabrous, laccate, azonate, slightly tubercular, very lightly marked with a few concentric furrows, margin acute: context soft-woody, pale ochraceous, 0.5 cm. thick, with dark horny radiations from the point of attachment: tubes not stratified, 3 mm. long, 5 to a mm., umbrinous within, mouths polygonal, honey-yellow, dissepiments entire, obtuse: spores subglobose, smooth, pale yellowish-brown, 4 × 5 μ.

Collected by C. L. Smith in Nicaragua during the winter of

1891–1892. This beautiful little plant is closely related in habit and general appearance to the American species of *Ganoderma* occurring farther north, but it is of much smaller size and its spores are quite distinct in form, size and color. It is possible that the specimens I have are not quite mature.

5. **Ganoderma Oerstedii** (Fries)

Polyporus Oerstedii Fries, Nov. Sym. 63. 1851.

Pileus reniform, ungulate-applanate, gibbous at the base, a foot in diameter; surface horny-incrusted, very glabrous, adorned with shallow furrows, which almost disappear with age, shining reddish chestnut becoming almost black; margin very obtusely truncate and marked with concentric furrows, the upper annual growths exceeding the lower; context partly hard and horny and partly floccose, umbrinous next to the tubes, more tawny beneath the cuticle, very thin in older specimens, the tubes forming the principal part of the pileus: tubes contiguous and hence indistinctly stratified, 3–5 cm. long, umbrinous within, mouths lighter in color, dissepiments entire, obtuse: spores broadly ellipsoid, truncate, very dark yellowish-brown, abundantly and roughly echinulate, 11 × 9 μ.

Two imperfect specimens of this plant are in the herbarium of the New York Botanical Garden, one collected by C. L. Smith in Nicaragua, and the other by C. T. Townsend on an orange tree in Jamaica. These specimens, while corresponding with the Friesian types at Upsala, hardly justify any considerable departure from the Friesian description.

6. **Ganoderma zonatum** sp. nov.

A soft laccate fungus of medium size marked with numerous tawny and chestnut-colored zones. Pileus very soft-corky, sessile, dimidiate, applanate or convex above, concave below, glabrous, zonate, not sulcate, 5 × 7 × 1.5 cm.; margin velvety, acute, becoming obtuse and concolorous: context very soft, floccose, radiate-fibrous, concentrically banded, 0.5 cm. thick, chocolate-brown: hymenium velvety, not stratose, tubes 1 cm. long, 3–4 to a mm., umbrinous within; mouths white to umbrinous, regular, polygonal, stuffed at first with whitish material, covered 0.5–2 cm. from the margin with yellowish or reddish varnish; dissepiments entire, obtuse to acute: spores elongated ellipsoid, smooth, pale yellowish-brown, 8–10 × 4–6 μ.

Collected by Professor Underwood in Florida. Closely related to *G. sulcatum*, but differing in general appearance, size of pores, and in the extent and arrangement of varnish upon the hymenium. A similar coating of varnish exists in *G. sulcatum* and *G. pseudoboletus* at times, but in neither of these has it been found as a broad distinct marginal band. This band is sometimes split by the growth of the margin and a zone of pores appears between the two laccate portions. Additional material may reveal the existence of intermediate forms connecting this species with *G. sulcatum*.

7. **Ganoderma sulcatum** sp. nov.

A large sessile plant without zones, but marked with a few conspicuous concentric furrows. Pileus corky, dimidiate, sessile or arising from a lateral tubercle, plane or convex above, thickest behind, 8 × 11 × 2 cm.; surface laccate, glabrous, azonate, fulvous to chestnut, deeply sulcate; margin rounded, velvety, ochroleucous, at length concolorous: context very soft, floccose, radiate-fibrous, concentrically banded, 1 cm. thick, umbrinous-chestnut: tubes indistinctly stratified, 1.25 cm. long, 4–5 to a mm., umbrinous within, mouths whitish or yellowish, at length umbrinous, dissepiments entire, obtuse: spores ellipsoid, pale yellowish-brown, smooth, 8–10 × 4–6 μ.

This plant was collected on soft palmetto logs in Florida by Mr. C. G. Lloyd, January, 1897; type in New York Botanical Garden. It is very nearly related to *G. zonatum*.

SPECIES INQUIRENDAE

Fomes incrustatus Fries, collected in Costa Rica by Oersted. Pileus 5–7 cm. broad, sordid umbrinous, laccate: context scanty, pallid, tubes concolorous; stipe central, torulose, unequal. This species was not transferred by Patouillard to the genus *Ganoderma*.

G. nutans (Fries) Pat., also collected by Oersted in Costa Rica. Pileus scarcely 2 cm. broad, orbicular, pallid to bay-black, laccate; context scanty, pallid, pores pallid to brown; stipe long, slender, twisted as though climbing, recurved at the apex, giving the pileus the appearance of nodding; spores ovoid, brown, echinulate, 12–15 × 10 μ.

Specimens seen in foreign herbaria appear to be very distinct. Fries' description in Novae Symbolae 61–62 is quite full and can-

not be improved upon at this time on account of lack of material for critical study.

G. nitens (Fries.) Pat. On trunks in tropical America. Pileus large, sessile, semiglobose, chestnut to black, shining, hanging by a process behind; context umbrinous, tubes very long and slender. It is quite possible that this is not a distinct species.

G. neglectum Pat. Pileus sessile, 8–10 cm. broad, reddish-black, shining; context brown, tubes white, very short; spores globose, yellow, roughly echinulate, 11 — 12 μ. On trunks in Nicaragua.

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